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10/776,515	02/12/2004	Donald J. Curry	117521	3669

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EXAMINER	
SHIKHMAN, MAX	
ART UNIT	**PAPER NUMBER**
2624	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/776,515	CURRY ET AL.	
	Examiner	Art Unit	
	Max Shikhman	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11/30/2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-13 and 15-20* is/are rejected.

7)☒ Claim(s) *3,14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07/12/2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Response to Amendment

1. Applicant's RCE filed 11/30/2007 has been entered and made of record.

2. Applicants' amendment has required new grounds of rejection. New grounds of rejection are therefore presented in the Office Action.

3. Applicant's arguments have been fully considered but are moot in view of the new ground(s) of rejection.

Claim Objections

4. Claims 1-8 objected to because of the following informalities:

Claim 1 line 7 recites the limitation "the pixel". There is insufficient antecedent basis for this limitation in the claim. Maybe change "the pixel" to --the current pixel--. Appropriate correction is required.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claim 20 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 20 Line 1, please change "A" to --A computer readable--.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1, 2, 5, 9-13, 20 rejected under 35 U.S.C. 103(a) as being unpatentable over Monobe, "Image processing apparatus" PGPUB-DOCUMENT-NUMBER: 20040165785 in view of Avinash US-PAT-NO: 6246783.

() Regarding Independent Claims 1, 12:

Monobe discloses as follows.

An apparatus, comprising: a first comparator ([0098] "205 checks") *that compares an edge continuity value of a current pixel* ([0098] continuity of each edge assumptive pixel) *of each* ([0098] each...pixel) *line of pixels to edge continuity values of pixels within a first neighborhood of the cur rent pixel, wherein the first neighborhood comprises at least 3 adjacent pixels* (4 neighboring pixels), *to generate compare results; and*

a blob identifier; and ([0098] interconnecting edge object)

an assigner ("decided to be interconnected") *that assigns a blob identification of a blob* ([0098] interconnecting edge object) *to the pixel* (detected edge assumptive pixel) *based on the compare results to associate the pixel with the blob.*

([0098] "In result of checking the continuity of all the edge assumptive pixels in the block and respective 4 neighboring pixels, a unit of edge assumptive pixels interconnecting in the block is called interconnecting edge object.")

Monobe discloses everything as described above except, *wherein the blob identifier includes a top-to-bottom module for analyzing each pixel in turn in raster scan order.*

Avinash discloses, *wherein the blob* (Col 3 line 50 or Col 8 line 46, "regions") *identifier includes a top-to-bottom module* (Col 4 line 9) *for analyzing each pixel* (Col 6 lines 2,27, "each image pixel") *in turn in raster scan order* (Col 6 line 1).

As Avinash discloses, it is desirable to analyze (Col 6 lines 1-10) each pixel of a raster scan for directional smoothing (204), which preserves edges of regions. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention, to use Avinash's method in Monobe, directional smoothing, to preserve edges enclosing regions (Fig2). This allows greater flexibility in enhancing images.

() Regarding Independent Claim 20:

For Claim 20: *A storage medium* ([0002]. [0008] "stored") *storing a set of program instruction* ([0202] "software". [0203] "computer program") *executable on a data processing device* ([0203] "computer". Claim 25, "program functioning on a computer"), *the set of program instructions comprising:*

The rest of limitations of Claim 20 are disclosed in Claim 1.

() **Regarding Claims 2, 13:**

The apparatus of claim 1, further comprising: a gradient parameter generator (Monobe. Fig12: 202. [0093] 202...Laplacian filtering) *that generates a gradient parameter value for the current pixel based on luminance and chroma values* ([0086] "RGB... to YCrCb". RGB contains YCrCb.) *of a second neighborhood* (gradient calculation uses neighborhoods) *of the current pixel; and a quantizer* (203 does zero crossing) *that quantizes the gradient parameter value to set an edge continuity value of the pixel.* ([0093] "203 detects an edge assumptive pixel by the zero crossing detection")

() **Regarding Claim 5:**

The apparatus of claim 2, wherein the second neighborhood of the current pixel includes a window of pixels surrounding the current pixel.

(Inherent, since 202 implements Laplacian filtering using 3x3 mask as in [0129], [0130] "neighboring 3x3 pixels")

() **Regarding Claims 9-11:**

A xerographic marking device incorporating the apparatus of claim 1.

A marking device incorporating the apparatus of claim 1.

A digital photocopier incorporating the apparatus of claim 1.

([0070] "FIG. 17 shows an image of which block distortion is removed by the image processing apparatus in the first embodiment." Printer/photocopier was able to print Fig 17.)

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9. Claims 4, 6-8, 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monobe PGPUB-DOCUMENT-NUMBER: 20040165785 and

Avinash US-PAT-NO: 6246783 as applied to Claims 1, 12, 20 above and further in view of Takahashi PGPUB-DOCUMENT-NUMBER: 20040081355.

() **Regarding Claim 4:**

wherein the first neighborhood of the current pixel includes pixels within a line of pixels including the current pixel and a top line of pixels previous to the line of pixels including the current pixel the top line including pixels having positions that are aligned to positions of pixels of the line of pixels including the current pixel, a pixel in the top line having a corresponding position of the current pixel being a top-adjacent pixel, a pixel to

a left side of the top adjacent pixel being a top-left adjacent pixel, and a pixel to a left side of the current pixel in the line of pixels being a left-adjacent pixel.

(Monobe. [0098] "205 checks pixels positioned at upper...left... of the detected edge assumptive pixel.")

Monobe discloses everything as described above except *a top-left adjacent pixel.*

Takahashi, in an analogous environment teaches a neighborhood of a top pixel, top left pixel and left pixel, [0020] "...color difference between two sets of pixels which are located on opposing sides of the object pixel with respect to that edge direction." RGB contains intensity, which is grayscale; the diagonal of an RGB color cube is intensity. Also, Fig 6 shows a 3x3 neighborhood, which includes top pixel, top left pixel and left pixel.

It may be desirable (Fig. 5: 11,12) to calculate four edge vectors, to find the edge strength and edge direction of an object pixel. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use Takahashi's method in Monobe to find an edge image (Fig. 5: 13). This helps to assign pixels to different regions.

() **Regarding Claim 6:**

Monobe discloses as follows.

The apparatus of claim 4, wherein the first comparator ([0098] "205 checks") *compares the edge continuity value of the current pixel* ([0098] continuity of each edge assumptive pixel) *with the edge continuity value of a top-adjacent pixel; and*

([0098] "205 checks pixels positioned at upper... of the detected edge assumptive pixel.")

the assigner ([0098] "decided to be interconnected") *assigns the current pixel a blob* ([0098] interconnecting edge object) *identification associated with the top-adjacent pixel based on the comparison of the edge continuity values.*

([0098] "In result of checking the continuity of all the edge assumptive pixels in the block and respective 4 neighboring pixels, a unit of edge assumptive pixels interconnecting in the block is called interconnecting edge object.")

() **Regarding Claims 7,16,19:**

The apparatus of claim 6, wherein the assigner uses an action table (Fig. 12) *to determine whether to assign the current pixel the blob identification associated with the top-adjacent pixel* ([0098] "205 checks pixels positioned at upper... of the detected edge assumptive pixel.")

based on a pattern of the edge continuation values of the top-adjacent pixel, the top left adjacent pixel and the left adjacent pixel.

(205 checks pixels positioned at upper ... left of the detected edge assumptive pixel.)

Monobe discloses everything as described above except *top left adjacent pixel.*

Takahashi, in an analogous environment teaches a neighborhood of a top pixel, top left pixel and left pixel, (Fig. 5: 11,12) [0020] "...color difference between two sets of pixels which are located on opposing sides of the object pixel with respect to that edge direction." Also, Fig 6 shows a 3x3 neighborhood, which includes top pixel, top left pixel and left pixel.

It may be desirable (Fig. 5: 11,12) to calculate four edge vectors, to find the edge strength and edge direction of an object pixel. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use Takahashi's method in Monobe, also use top left adjacent pixel, to find an edge image (Fig. 5: 13). This helps to assign pixels to different regions.

() **Regarding Claims 8, 17:**

Monobe does not explicitly mention *the apparatus outputs a table that contains a list of blob identifications associated with pixels of line of pixels including the current pixel.*

Takahashi, in an analogous environment teaches, [0186] "FIG. 36 shows an example of a region image whose data are stored in the region data storage section 4. Labels such as "1" and "2" are attached to each of the pixels, as shown in the left side of FIG. 36. All of the pixels located within a specific region have the same label, i.e., there is a region containing only pixels having the label 1, a region containing only pixels having the label 2, and so on.

It is desirable to separate an image into various regions for object recognition (Takahashi [0185], [0187]). Therefore, it would have been obvious to one having

ordinary skill in the art at the time the invention was made to use the pixel labeling by regions of Takahashi in the method of Monobe to identify objects from clutter in the image.

() **Regarding Claim 15:**

wherein the first neighborhood of the current pixel includes pixels within a line of pixels of including the current pixel and a top line of pixels previous to the line of the pixels including the current line, the top line including pixels having positions that are aligned to positions of pixels of the line of pixels including the current pixel, a pixel in the top line having a corresponding position of the current pixel being a top-adjacent pixel, a pixel to a left side of the top adjacent pixel being a top-left adjacent pixel, and a pixel to a left side of the current pixel in the line of pixels being a left-adjacent pixel,

(Monobe. [0098] "205 checks pixels positioned at upper...left... of the detected edge assumptive pixel.")

Monobe discloses everything as described above except *a top-left adjacent pixel.*

Takahashi, in an analogous environment teaches a neighborhood of a top pixel, top left pixel and left pixel, [0020] "...color difference between two sets of pixels which are located on opposing sides of the object pixel with respect to that edge direction." RGB contains intensity, which is grayscale; the diagonal of a normalized RGB color cube is intensity. Also, Fig 6 shows a 3x3 neighborhood, which includes top pixel, top left pixel and left pixel.

It may be desirable (Fig. 5: 11,12) to calculate four edge vectors, to find the edge strength and edge direction of an object pixel. Therefore, it would have been obvious to one having

ordinary skill in the art at the time the invention was made to use Takahashi's method in Monobe to find an edge image (Fig. 5: 13). This helps to assign pixels to different regions.

Monobe discloses, *the method further comprising: comparing* ([0098] "205 checks") *the edge continuity value of the current pixel* ([0098] continuity of each edge assumptive pixel) *with the edge continuity value of a top-adjacent pixel*;

([0098] "205 checks pixels positioned at upper... of the detected edge assumptive pixel.")

assigning ([0098] "decided to be interconnected") *the current pixel to a blob* ([0098] interconnecting edge object) *identification associated with the top-adjacent pixel based on the comparison of the edge continuity values.*

([0098] "In result of checking the continuity of all the edge assumptive pixels in the block and respective 4 neighboring pixels, a unit of edge assumptive pixels interconnecting in the block is called interconnecting edge object.")

() **Regarding Independent Claim 18:**

Monobe discloses as follows. A *blob identifier, comprising:*

means for comparing ([0098] "205 checks") *an edge continuity value of a current pixel* ([0098] continuity of each edge assumptive pixel) *of each* ([0098] each...pixel) *line of pixels to edge continuity values of pixels within a first neighborhood of the current pixel comprising at least three adjacent pixels* ([0098] 4 neighboring pixels) *to generate compare results*

means for assigning a blob identification of a blob ([0098] interconnecting edge object) *to the current pixel* (detected edge assumptive pixel) *based on the compare results to associate the current pixel with the blob.*

([0098] "In result of checking the continuity of all the edge assumptive pixels in the block and respective 4 neighboring pixels, a unit of edge assumptive pixels interconnecting in the block is called interconnecting edge object.")

wherein the first neighborhood of the current pixel includes pixels within a line of pixels including the current pixel and a top line of pixels previous to the line of the current pixel, the top line including pixels having positions that are aligned to positions of pixels of the line of pixels including the current pixel, a pixel in the top line having a corresponding position of the current pixel being a top-adjacent pixel, a pixel to a left side of the top adjacent pixel being a top-left adjacent pixel, and a pixel to a left side of the current pixel in the line of pixels being a left-adjacent pixel; and

(Monobe. [0098] "205 checks pixels positioned at upper...left... of the detected edge assumptive pixel.")

means for assigning ([0098] "decided to be interconnected") *a blob identification of a blob* ([0098] interconnecting edge object) *to the current pixel* (detected edge assumptive pixel) *based on the compare results to associate the current pixel with the blob.*

([0098] "In result of checking the continuity of all the edge assumptive pixels in the block and respective 4 neighboring pixels, a unit of edge assumptive pixels interconnecting in the block is called interconnecting edge object.")

Monobe discloses everything as described above except *a top-left adjacent pixel.*

Takahashi, in an analogous environment teaches a neighborhood of a top pixel, top left pixel and left pixel, (Fig. 5: 11,12) [0020] "...color difference between two sets of pixels which are located on opposing sides of the object pixel with respect to that edge direction." RGB contains intensity, which is grayscale; the diagonal of a normalized RGB color cube is intensity; there is a conversion between YUV and RGB. Also, Fig 6 shows a 3x3 neighborhood, which includes top pixel, top left pixel and left pixel.

It may be desirable (Fig. 5: 11,12) to calculate four edge vectors, to find the edge strength and edge direction of an object pixel. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use Takahashi's method in Monobe, also use top left adjacent pixel, to find an edge image (Fig. 5: 13). This helps to assign pixels to different regions.

Monobe and Takahashi disclose everything as described above except, *a top-to-bottom module for analyzing each pixel in turn in raster scan order.*

Avinash discloses, *wherein the blob* (Col 3 line 50 or Col 8 line 46, "regions") *identifier includes a top-to-bottom module* (Col 4 line 9) *for*

analyzing each pixel (Col 6 lines 2,27, "each image pixel") *in turn in raster scan order* (Col 6 line 1).

As Avinash discloses, it is desirable to analyze (Col 6 lines 1-10) each pixel of a raster scan for directional smoothing (204), which preserves edges of regions. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention, to use Avinash's method in the combined method of Monobe and Takahashi,

directional smoothing, to preserve edges enclosing regions (Fig2). This allows greater flexibility in enhancing images.

Allowable Subject Matter

10. **Claims 3** and **14** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. This is a statement of reasons for allowable subject matter.

Claim 3 would be allowable because the prior art does not disclose, "gradient parameter generator is a grayscale selector generator that includes a second comparator that compares luminance values of pixels within the second neighborhood of the pixel to output a maximum luminance value and a minimum luminance value of the second neighborhood, the second comparator further outputs first chroma values and second chroma values that correspond to a location of the respective maximum luminance and minimum luminance values, wherein a dependent maximum value is a combination of the first chroma values and the maximum luminance value, and a dependent minimum value is a combination of the second chroma values and the minimum luminance value; the grayscale selector generator generating a grayscale selector value based on the dependent maximum value and the dependent minimum value" along with other limitations in the claim.

Claim 14 would be allowable because the prior art does not disclose, "comparing luminance values of pixels within the second neighborhood of the pixel to output a maximum luminance value and a minimum luminance value of the second neighborhood; further outputting first chroma values and second chroma values that correspond to a location of the respective maximum luminance value and the minimum luminance value, wherein a dependent maximum value is a combination of the first chroma values and the maximum luminance value and a dependent minimum value is a combination of the second chroma values and the minimum luminance value; generating a grayscale selector value based on the dependent maximum value and the dependent minimum value", along with other limitations in the claim.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Max Shikhman whose telephone number is (571) 270-1669. The examiner can normally be reached on Monday-Friday 8:30AM-6:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, JINGGE WU can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Max Shikhman
1/1/2007

JINGGE WU
SUPERVISORY PATENT EXAMINER